



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,868	06/07/2005	Yoshiaki Hasegawa	OKUDP0116US	8395

51921 7590 03/08/2007  
MARK D. SARALINO (MEI)  
RENNER, OTTO, BOISSELLE & SKLAR, LLP  
1621 EUCLID AVENUE  
19TH FLOOR  
CLEVELAND, OH 44115

EXAMINER
----------

INGHAM, JOHN C

ART UNIT	PAPER NUMBER
----------	--------------

2814

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/537,868	HASEGAWA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	John C. Ingham	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4-14 and 16-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-14 and 16-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

1. The amendments to the claims filed 17 December 2006 have been entered.

#### *Claim Objections*

2. Claim 13 is objected to because of the following informalities: "the two overhanging portions" lacks antecedent basis. Appropriate correction is required.

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
5. Claims **1, 4-14 and 16-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (US 6,522,676) and Sirbu (US 6,542,531).

Art Unit: 2814

6. Regarding claims **1, 4-5 and 7**, Goto discloses in Fig 6 a semiconductor light-emitting element comprising: a first group II-V compound semiconductor (5a); a current confining layer (6), which is made of a second group III-V compound semiconductor that has grown on a selected surface area of the first group III-V compound semiconductor and which has a striped opening (see Fig 1) extending along the length of a resonant cavity; and a third group III-V compound semiconductor (5b), which covers the surface of the first group III-V compound semiconductor that is exposed through the striped opening and the surface of the current confining layer, wherein the group III-V compound semiconductors are gallium nitride based (col 8 ln 10-17), and wherein the current confining layer (6) has two overhanging portions (above area 52) that overhang toward the striped opening, wherein a gap (filled by 52) is provided between each of the two overhanging portions of the current confining layer and a part of the surface of the first group III-V compound semiconductor (5a), wherein the gap has a height of  $0.1\mu\text{m}$  and a width of  $0.5\mu\text{m}$  (col 8 ln 46-51) and wherein a portion of the third group III-V compound semiconductor (5b), which contacts with the surface of the first group III-V compound semiconductor through the striped opening has a width of  $2.5\mu\text{m}$  (W2).

Goto does not specify that the gap is unfilled by the third group III-V compound semiconductor. However, Sirbu teaches in Fig 1A that air gaps are used on either side of a current aperture in order to restrict current flow and vary the index of refraction within the active region (col 4 ln 28-35). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teaching of Sirbu on the device of Goto in order to vary the index of refraction within the active region.

Art Unit: 2814

7. Regarding claim 6, Goto discloses in Fig 6 the element of claim 1 wherein the first group III-V compound semiconductor has a multilayer structure (3, 4, 5a) including an active layer (4).

8. Regarding claim 8, Goto discloses in Fig 6 the element of claim 7 wherein the current confining layer (6) is AlGaIn and has a thickness of 0.3 $\mu$ m (col 8 ln 16, 30).

9. Regarding claims 9-11, Goto discloses in Fig 6 the element of claim 1 wherein the conductivity of the first (5a) and third (5b) group III-V compound semiconductors is the same (p type), and wherein the conductivity of the second group III-V compound semiconductor is opposite (n type).

10. Regarding claim 12, 16 and 18, Goto discloses in Fig 8 a method for fabricating a semiconductor light-emitting element, the method comprising the steps of: (step a) providing a striped masking layer (15), with a width set to 2.5 $\mu$ m, on a first Group III-V compound semiconductor (56a); selectively growing a second Group III-V compound semiconductor (6) over the entire surface of the first group III-V compound semiconductor except a portion covered with the masking layer, thereby forming a current confining layer that has a striped opening defined by the masking layer (step b) and overhanging portions that overhang the striped opening; selectively removing the masking layer; and growing a third Group III-V compound semiconductor (56b), to cover the surface of the first group III-V compound semiconductor (which is exposed through the striped opening at a portion with a width of 2 $\mu$ m) and the surface of the current confining layer (step c), wherein the growing of the third group III-V compound semiconductor includes providing gaps between the first group III-V compound

Art Unit: 2814

semiconductor (56a) and the overhanging portions (portions of 6 above areas 52), and wherein the group III-V compound semiconductors are gallium nitride based (col 8 ln 10-17).

Goto does not specify that the gap is unfilled by the third group III-V compound semiconductor. However, Sirbu teaches in Fig 1A that air gaps are used on either side of a current aperture in order to restrict current flow and vary the index of refraction within the active region (col 4 ln 28-35). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teaching of Sirbu in the method of Goto in order to vary the index of refraction within the active region.

11. Regarding claim 13, Goto discloses in Fig 8(b) the method of claim 12 wherein the step of selectively growing a second group III-V compound semiconductor (6) includes growing laterally toward the center of the masking layer, thereby defining two overhanging portions for the current confining layer (col 9 ln 7-17).

12. Regarding claim 14, Goto discloses in Fig 8(c) the method of claim 13 wherein the removal of the masking layer includes removing parts of the masking layer (15), which are located under the overhanging portions of the current confining layer (6), thereby making the overhanging portions (area 52) overhang toward the center of the striped opening.

13. Regarding claim 17, Goto discloses in Fig 6 the element of claim 1 wherein the first group III-V compound semiconductor has a multilayer structure (3, 4, 5a) including an active layer (4).

Art Unit: 2814

14. Regarding claim **19**, Goto discloses in Fig 6 the element of claim 7 wherein the current confining layer (6) is AlGaIn and has a thickness of 0.3 $\mu$ m (col 8 ln 16, 30).

### ***Response to Arguments***

15. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2814

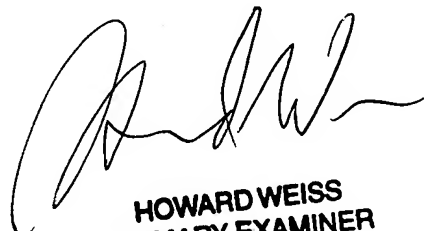
Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John C Ingham  
Examiner  
Art Unit 2814

jci



**HOWARD WEISS**  
**PRIMARY EXAMINER**